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December 11, 1992

Ms. Donna R. Searcy
Secretary
Federal Communications Commission
Room 222
1919 M Street, N.W.
Washington, D.C. 20554

Re: ET Docket 92-9

Dear Ms. Searcy:

On behalf of Harris Corporation-Farion Division, Digital Microwave Corporation and Telesciences, we are filing an original and nine (9) copies of their Joint Comments in the above-referenced proceeding.

The staff is requested to communicate with us if additional is desired.

Respectfully submitted,

FLETCHER, HEALD & HILDRETH

By: George Petrutsas

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Enclosures

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Federal Communications Commission **RECEIVED**

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DEC 11 1992

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

In the Matter of)	
)	
Redevelopment of Spectrum to)	ET Docket No. 92-9
Encourage Innovation in the)	
Use of New Telecommunications)	RM-7981
Technologies)	RM-8004

To: The Commission

**JOINT COMMENTS OF HARRIS CORPORATION-FARINON DIVISION,
DIGITAL MICROWAVE CORPORATION, AND TELESSCIENCES, INC.**

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SUMMARY

Harris Corporation - Farinon Division, Digital Microwave Corporation and Telesciences, Inc. (together, the "Joint Commenters"), comprising the top three American manufacturers of microwave equipment in the United States, have carefully studied the Commission's Notice of Proposed Rulemaking in the proceeding and concur with many of the proposals contained therein. Nevertheless, the Joint Comments have concluded that certain important changes in the Commission's proposal should be made. The important changes recommended in these Joint Comments include 1.25 MHz based channelization plans, phased in new high efficiency standards for digital microwave equipment, the same interference protection standards and coordination procedures for both common carrier and private systems, and requirements for substantial justification of applications for wideband channels, including strict implementation and loading requirements.

The changes recommended by the industry will promote the more effective and efficient utilization of the microwave band involved, will facilitate the orderly migration of the 2 GHz band users, and will promote industry competitiveness. Therefore, adoption of the recommended changes will be consistent with and help achieve the Commission's objectives in the proceeding and will be in the public interest.

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To: The Commission

**JOINT COMMENTS OF HARRIS CORPORATION-FARINON DIVISION,
DIGITAL MICROWAVE CORPORATION, AND TELESCIENCES, INC.**

Harris Corporation - Farinon Division ("Harris"), Digital Microwave Corporation ("DMC") and Telesciences, Inc. (together, the "Joint Commenters"), by their attorneys, hereby submit their Joint Comments in response to the Notice of Proposed Rulemaking, released September 4, 1992, in the above-captioned proceeding (the "Notice").

I. INTRODUCTION

The Joint Commenters collectively have over 85 years of extensive experience in designing, developing and manufacturing advanced high quality microwave equipment for terrestrial fixed microwave systems. Harris offers both analog and digital product lines. DMC specializes in high performance digital equipment with the capacity to transmit and receive multiple DS1, DS2 and single DS3 lines carrying voice, data and video signals over distances of up to 40 miles. Telesciences designs, manufactures, installs and services analog and digital microwave radio transmission systems, which operate in, among other frequencies, the 1.8 to 2.2 GHz band.

Over the past three years, the Joint Commenters have collectively provided two-thirds of all 2 GHz digital microwave radios and over 80% of analog radios used in the U.S. Moreover, the Joint Commenters have historically pioneered innovations in radio technology and spectrum efficiency. The Joint Commenters' accomplishments in advancing radio technology include introduction of the first 2 GHz analog radio in 1948, and the first 2 GHz digital radio in 1972. In the area of spectrum efficiency the Joint Commenters' accomplishments include the introduction of the first 45 megabit radio at 6 GHz to occupy only 10 MHz of bandwidth, the first 12 DS1 radios at 10 GHz, and the first 10 GHz, 18 GHz, 23 GHz, and 38 GHz radios introduced into the U.S. market. Telesciences was the first to manufacture and make commercially available the 38 GHz radios used in the United Kingdom's version of personal communications services. Typical customers of the Joint Commenters operating in the 2 GHz band include local exchange telephone companies, power companies, cellular telephone companies, utilities, railroads, and state and local governments.

As leading manufacturers of the equipment that is utilized by the private and common carrier users whose operations will be substantially impacted by the proposals in this proceeding, the Joint Commenters believe that the public interest requires the Commission to adopt technical standards and procedures that will permit an orderly, efficient transition of existing 2 GHz users to higher frequency bands shared by private and common carriers. The Joint Commenters support the Commission's objective of facilitating the introduction of emerging technologies in this and other

proceedings and have no desire to delay the migration of current users of the 2 GHz band to higher frequencies. However, it is imperative that the Commission recognize that the channelization and other technical rules for the replacement bands established in this proceeding are critical to the existing microwave equipment industry and microwave users.

The Joint Commenters previously filed individual comments generally supporting the proposals in the petitions that formed the basis of the Commission's proposals in this proceeding, namely RM-7981 filed by the Utilities Telecommunications Council ("UTC") and RM-8004, filed by Alcatel Network Systems, Inc. ("Alcatel"). Harris, however, pointed out the complexity of the issues and urged the Commission to delay this proceeding until an industry/government advisory committee was established to develop an industry consensus and recommendations on the technical as well as the policy issues raised. While recognizing that such a committee could "serve a highly useful function", the Commission nevertheless rejected the proposal, although it encouraged the formation of an industry committee to consider and comment on the Commission's proposals in the Notice.

The Joint Commenters, as major American microwave manufacturers,¹ have carefully studied the Commission's proposal and concur with the proposals regarding minimum path length

¹ The Joint Commenters comprise the top three American manufacturers of microwave equipment in the United States. Although Alcatel Network Systems is the third largest equipment manufacturer in the U.S., behind Harris and Telesciences, it is not an American owned company. DMC is the fourth largest manufacturer in the United States.

requirements, antenna characteristics, power limitations, emission and bandwidth limitations, and frequency diversity transmissions.² Nevertheless, the Joint Commenters have concluded that certain modest rule changes should be made. The Joint Commenters understand that the Telecommunications Industry Association's Fixed Point-to-Point Communications Section is filing comments proposing modifications of the Commission's proposal consistent with those proposed herein. Accordingly, these modifications represent an industry consensus, and if adopted, will not only maximize spectrum utilization and the orderly migration of displaced 2 GHz band users, but also will minimize the adverse impact to new and existing licensees, while maintaining industry competitiveness. The modifications proposed herein are as follows: (a) Adoption of a revised, 1.25 MHz based channelization plan, (b) adoption of a requirement for substantial justification for the assignment of wideband channels (i.e., 15 MHz and greater channel bandwidth) based on initial capacity requirements, together with strict implementation and use schedules; (c) phasing-in of new efficiency standards for digital microwave equipment; (e) adoption of the same interference protection criteria, and coordination procedures, for both private and common carrier systems; (f) no formalization of the practice of reserving growth channels; (g) adoption of more flexible rules than those proposed for authorization and use of microwave equipment with automatic transmitter power control; and (h) early conclusion of negotiations with NTIA and adoption of conditions and/or standards for non-government licensee access to

² See Notice at Para. 25.

the 1.7-1.85 and 3.6-3.7 GHz bands. The Joint Commenters urge the Commission to adopt the proposed channelization plans and technical rules for the higher frequencies as expeditiously as possible so that they can begin retooling their facilities to accommodate 2 GHz users who will migrate to higher frequency bands.

II. THE PROPOSED CHANNELIZATION PLANS SHOULD BE MODIFIED

A. The Channelization Plans Should Be Based on 1.25 MHz Channels

Except for the 11 GHz band, all of the channelization plans proposed in the Further Notice utilize 1.6 MHz-based channels. This stems from the fact that the plans proposed in the Further Notice are essentially those proposed by Alcatel in its petition for rulemaking (RM-8004). Since the vast majority of U.S. microwave manufacturers do not produce equipment compatible with 1.6 MHz-based channels, the proposed channelization plans have the effect, albeit unintended, of giving a competitive advantage to one manufacturer. The result of this failure to create a level playing field in the post-Docket 92-9 equipment manufacturing market will be additional costs to users, and those costs will have to be passed along to the users' customers. To remedy this competitive imbalance, the Joint Commenters recommend that the channelization plans be modified to incorporate 1.25 MHz-based channels.³

There are other important reasons why an 1.25 MHz base channel plan is preferable. First, 1.25 MHz-based channels would correspond to the bandwidths employed in the 10 GHz channelization

³ A complete channelization plan for all of the bands involved is in the attached Appendix I.

plan (e.g., 1.25, 2.5, 3.75, and 5 MHz).⁴ The 10 GHz channelization plan is a good current example of a narrowband channelization plan above 2 GHz which has been successful in meeting the needs of microwave users. Second, since the number of megahertz in standard bandwidth channels (i.e., 5, 10, 15, and 30 MHz) are multiples of 1.25, 1.25 MHz based channels would allow easy expansion of narrowband channel capacity to larger bandwidth channels. Thus, 1.25 MHz-based channels are preferable to 1.6 MHz-based channels in that they are more spectrum efficient and allow greater spectrum utilization when systems are expanded. Under a 1.6 MHz-based channelization plan, a system that expands to greater bandwidth channels would waste spectrum by leaving large spectrum remnants. For example, in terms of expanding into a 30 MHz channel, a 1.6 MHz-based channelization plan would waste the following amounts of spectrum:

<u>Channel Bandwidth</u>	<u># of Freq. Pairs</u>	<u>Wasted Spectrum</u>
0.8 MHz	37	0.4 MHz
1.6 MHz	18	1.2 MHz
3.2 MHz	9	1.2 MHz

By contrast, as the table below demonstrates, there would be no wasted spectrum with a 1.25 MHz based channelization plan:

<u>Channel Bandwidth</u>	<u># of Freq. Pairs</u>	<u>Wasted Spectrum</u>
1.25 MHz	24	0
2.50 MHz	12	0
3.75 MHz	8	0

⁴ See Report and Order, Gen Dkt. No. 90-216, 6 FCC Rcd. 972 (1991).

The amount of spectrum which 1.6 MHz channels would waste is not merely hypothetical. For example, more than 70 per cent of the 2 GHz common carrier digital microwave systems licensed in 1991 have been assigned 3.5 MHz bandwidth channels. To the extent these systems are relocated to the 6 GHz band and need comparable bandwidths under a 1.6 MHz-based plan, they would be forced to use three 1.6 MHz channels. Yet another reason for preferring 1.25 MHz-based channels over 1.6 MHz channels is the fact that there is little common carrier demand for 1.6 MHz channels.

B. The Lower 6 GHz Band Should Be Re-Channelized to Better Accommodate the Needs of 2 GHz Migrants

While the Joint Commenters agree with the flexibility the Commission proposes to build into the channelization plan for the 5.925-6.425 GHz ("lower 6 GHz") band, particularly in terms of creating a number of narrowband channel options, the Joint Commenters nevertheless recommend that the channelization plan for that band be further revised. That plan should be revised first to reflect the proposed 1.25 MHz based channelization approach discussed above and secondly to accommodate more adequately the expected requirements of 2 GHz migrants as well as future microwave users. Accordingly, the Joint Commenters propose that the Commission adopt a revised channel plan for the lower 6 GHz band which includes a number of 1.25, 2.5, and 3.75 MHz channels,⁵ instead of the .4, .8 and 1.6 MHz channels the Commission has proposed, and create several 15 MHz channels while maintaining the

⁵ Footnote 1 of the attached channelization plan states that narrowband channels in the upper 6 GHz band should be used before the narrowband channels in the lower 6 GHz band to preserve use of the 30 MHz channels in that band.

10 and 30 MHz channels the Commission has proposed. The recommended 15 MHz channels would provide another channel option between the 10 and 30 MHz bands, and thus avoid the need for channel concatenations, and provide for the use of high capacity systems without having to resort to possible inefficient use of 30 MHz channels.⁶

The 400 and 800 KHz channels would be eliminated partly as a result of the recommended switch to 1.25 MHz channelization approach. Moreover, microwave systems employing 400 or 800 KHz channels would not be practical from an economic standpoint. Existing microwave licensees of 800 MHz channels in the private 2 GHz bands who employ analog systems will most likely use current generation digital equipment as they migrate into the higher bands, and that equipment is currently designed around a 1.25 MHz based plan. Even if these users do not upgrade to digital equipment, their 800 KHz systems can be accommodated in 1.25 MHz channels.

C. 40 MHz Channels Should Be Provided in the 4 GHz Bands

The Joint Commenters believe that the Commission should provide a substantial number of 40 MHz channels to accommodate the needs for very high capacity systems, primarily in the common carrier industry, including growing requirements of the cellular industry for such high capacity purposes as backhauling traffic to major switching centers. Because the 3.7-4.2 GHz band is used

⁶ However, after the implementation of new phased-in bit efficiency standards, as proposed herein in Section V, equipment using 10 MHz channels could carry the traffic currently carried on 15 MHz channels. Accordingly, these 15 MHz channels should be phased-out after that 5 year transition period, and the spectrum re-channelized into 10 MHz channels.

extensively for satellite operations, it is not expected to accommodate displaced 2 GHz users for narrowband operations. Moreover, narrowband channels in this band would not be practical or economical with 40 MHz separations between transmit and receive frequencies, which is the current industry practice in that band. Therefore, narrowband channels as such are not provided for in the channelization plan attached hereto, and the Joint Commenters recommend that the 3.7-4.2 GHz band be re-channelized into 20 and 40 MHz channels.

D. A Broad Range of Wideband and Narrowband Channels
Should Be Made Available in the 11 GHz Band

While 40 MHz channels should be maintained in the 10.7-11.7 GHz band to accommodate high capacity users, the rest of that band should be re-channelized to provide a range of wideband and narrowband channels. Such a plan will promote spectrum efficiency while serving the diverse needs of the users who will be migrating to this band.⁷ The following channels are made available under the channelization plan recommended herein:

<u>Bandwidth</u>	<u>No. of Channels Available</u>
40 MHz	11
30 MHz	12
20 MHz	22
10 MHz	47
5 MHz	19
3.75 MHz	24
2.5 MHz	38
1.25 MHz	76

⁷ This channelization plan is modelled after the plan for the lower 6 GHz band, in that two wideband channels have been subdivided into narrowband channels.

While the proposal in the Notice would adopt only 10 and 30 MHz channels, the channelization plan proposed herein will permit users with diverse needs to use 11 GHz frequencies. This plan will also have the added benefit of reducing congestion in the 6 GHz band, the only other low frequency allocation with 10 MHz bandwidth channels.

E. Channel Concatenations Generally Should Not Be Allowed

If the proposed channelization plans are revised in the manner suggested by Joint Commenters, channels of all bandwidths should be available and the industry will be able to avoid the arbitrary channel concatenations that are prevalent today. In the view of Joint Commenters, a policy that generally prohibits channel concatenations will increase spectrum utilization by minimizing the creation of "splinter channels" created by the assignment of non-standard channels. Of course, even though the channelization plan recommended herein minimizes the impact on existing licensees and maximizes the number of potential users, the creation of at least some splinter channels, either in the form of isolated narrow bandwidth channels or broken channel pairs, will be the inevitable result of overlaying new channelization plans on the existing frequency environment.

In the view of Joint Commenters, the use of non-standard bandwidth channels, either channel concatenations or splinter channels, should be allowed only upon an appropriate showing that the authorization of such a channel is necessary and would not

preclude the future authorization of standard bandwidth channels in the area of proposed operation.⁸

III. APPLICANTS FOR WIDEBAND CHANNELS IN BANDS UNDER 15 GHz SHOULD BE REQUIRED TO SUBMIT EXTENSIVE JUSTIFICATION AND SUBJECT TO STRINGENT CHANNEL LOADING REQUIREMENTS

With demand for point-to-point frequencies above 2 GHz expected to increase dramatically, spectrum in those bands will be more valuable than ever. Therefore, it is essential that large chunks of that spectrum not be doled out routinely and that the Commission ensure that, when spectrum is assigned in relative large portions, it is used efficiently and not warehoused, otherwise, an unnecessary shortage of such channels could result. Therefore, the Joint Commenters propose that the Commission adopt the following requirements designed to ensure efficient utilization of wideband channels and to prevent spectrum warehousing.

First, applicants for wideband channels (15 MHz and greater) should be required to submit more extensive justification than other applicants. For example, wideband applicants should be required to demonstrate that their stated communications requirements cannot be satisfied with a narrower channel. They should also be required to show that they will be able to satisfy

⁸ Harris has previously noted, for example, that the assignment of a given transmit channel under an old channelization plan may preclude the assignment of the corresponding return channel under a new channelization plan. In this connection, the Joint Commenters believe that the rules should be flexible enough to enable system planners and coordinators to use a transmit channel from one pair and a return channel from another, if circumstances so dictate. At the same time, the rules should be specific as to the assignment policies governing the use of such "splinter" channels. See Comments of Harris, RM-8004, filed July 2, 1992, at 8.

the channel loading requirements for wideband channels. Moreover, Part 94 applicants who plan to resell excess capacity should be required to submit contracts with their applications evidencing concrete demand for such capacity.

Second, more stringent channel loading requirements must be adopted for wideband assignments. Wideband applicants should be required to demonstrate a need for initial channel loading of at least 50 percent of capacity (e.g., that more than one DS-3 circuit has been deployed in a 30 MHz channel). The Joint Commenters also recommend that the Commission authorize independent auditors to examine loading of existing systems. Such auditors would be employed and paid by new applicants seeking frequencies in congested areas. If the auditor discovers that an existing licensee has failed to maintain the required loading, upon Commission confirmation of such a finding, the license should be automatically canceled or the operation should be converted to an appropriate narrowband channel.⁹

IV. TECHNICAL STANDARDS AND COORDINATION PROCEDURES FOR PARTS 21 AND 94 SHOULD BE IDENTICAL

The proposals in this proceeding will have a substantial impact on the operations of private and common carriers microwave users throughout the country. While the Joint Commenters recognize that these changes are necessitated by the spectrum requirements for emerging technologies, the Commission must ensure that the

⁹ These proposed loading requirements should be applied on a prospective basis only. Existing licensees should be grandfathered.

migration of displaced 2 GHz band users to higher bands, and the transition from separate private and common carrier bands to a co-primary shared environment, is implemented in an orderly fashion. In order to minimize the problems that could arise from this massive transition, the Commission should modify Parts 21 and 94 so that identical interference standards and coordination procedures apply to both private and common carriers microwave systems sharing the 4, 6, 10 and 11 GHz bands.

A. Interference Standards

There is no longer any significant justification for having different interference protection standards for private and common carriers sharing the 4, 6, 10 and 11 GHz bands on a co-primary basis. The equipment used by both private and common carriers will be increasingly identical. There is no logical reason why operations in the same bands with substantially the same equipment should not be accorded the same protection from interference. Indeed, the Commission has recognized that as a practical matter the interference standards for private and common carriers are rapidly converging. Notice at para. 30. Furthermore, as a result recent changes, both private and common carrier fixed microwave applications are now processed by the same staff in Gettysburg. The Joint Commenters, therefore, recommend that the interference standards prescribed in Part 94 should be incorporated into Part 21, and should be applied to all users of the 4, 6, 10 and 11 GHz bands being reallocated for co-primary use by common carrier and private users. Existing Part 94 standards have been proven to

provide sufficient protection and are administered by a recognized standards body, TIA TR14.11.

B. Coordination Procedures

In paragraph 30 of the Notice, the Commission proposes to maintain separate coordination procedures for private and common carrier applications. However, the Joint Commenters believe that many of the reasons that require uniform interference protection standards also require that there should be identical coordination procedures for both private and common carrier microwave systems.

The Joint Commenters urge the Commission to adopt the prior coordination notice procedures provided for in Section 21.100(d) into Part 94, and to use these procedures for both private and common carrier users in the shared 4, 6, 10 and 11 GHz bands. First, the coordination notice procedure assures that users potentially affected by a proposal will be alerted to the possible new interference. They will be contacted directly, rather than having to review the Commission's weekly public notices. Second, if disputes arise regarding possible interference, they can be resolved by dialogue, rather than having to file petitions to deny applications, triggering time consuming Commission processes.

C. The Commission Should Not Formalize the Reservation of Growth Channels on Coordinators' Data Bases

In paragraph 30 of the Notice, the Commission seeks comments on formalizing the common practice of "reserving" channels in frequency coordination data bases for future growth. The Joint Commenters recognize that providing for the foreseeable growth of existing microwave systems is an important part of an orderly and efficient licensing system. Unfortunately, the "reservation" of

growth channels on coordinators' data bases can be used to block expansion of other systems rather than to protect growth. This practice is clearly contrary to wise spectrum management,¹⁰ and accordingly, the Joint Commenters urge the Commission not to "formalize" any such procedure.¹¹ Spectrum should continue to be licensed on a first-come, first-served basis without regard to its unlicensed "reserved" status on a frequency coordinator's data base.

The Commission has previously recognized that the coordination process can be used in a manner that is wasteful of spectrum. Section 21.100(d) of the Rules does require the prior coordination of microwave proposals and states that "[a]pplicants should make every reasonable effort to avoid blocking the growth of systems that are likely to need additional capacity in the foreseeable future." However, in the Order adopting the current version of Section 21.100(d), the Commission considered but expressly declined to adopt a proposal that would have required applicants to prior coordinate with anyone in the area that had previously coordinated a proposal, even though those parties had not applied to the Commission for the desired frequency. Public Fixed Stations

¹⁰ Furthermore, the administration of the spectrum should not be placed on frequency coordinators; rather, any protection of growth should be through the Commission, which is authorized to assign spectrum.

¹¹ In earlier comments in this proceeding, Harris recommended that the informal frequency coordinator "reservation process" be formalized, but noted that the growth channel issue may ultimately be resolved by technological means such as cross-polarization. Upon further consideration, Harris has concluded that, as stated herein, such formalization could lead to waste of valuable spectrum.

(Revision of Part 21), 63 R.R. 2d 1344 (1987). The Commission stated that:

[a]s a matter of policy, the Commission should not recognize interference protection claims of parties who are not applicants. First, the prior coordination process is designed to ensure greater efficiency in use of the spectrum. Requiring a carrier to prior coordinate with those who have previously coordinated but not filed an application could result in less efficient use of the spectrum as carriers would be coordinating with proposals that may never be implemented, and that, in fact, may be speculative. The suggestion is not practical. Prior coordination is essentially a private matter that occurs without direct Commission involvement.

Id. at 1354.

Commission recognition of frequencies "reserved" on coordinator data bases, but not applied for, would conflict with the policy stated above: it would result in an inefficient use of the spectrum since it would sacrifice actual uses of spectrum to "proposals that may never be implemented, and that, in fact, may be speculative."

Id. ¹²

Thus, while the coordination process serves many useful purposes and should be retained, the Commission should not promote

¹² Even if a user does in fact plan to use its "reserved" coordinated frequencies at some point in the future, this does not mean that it should be allowed to warehouse this spectrum indefinitely when others propose to use it presently. Allowing such warehousing would constitute inefficient spectrum management, and furthermore would allow one carrier to unfairly block the growth of others. This is clearly contrary to Commission policy. See Southern Pacific Communications Co., 37 F.C.C.2d 245 (1972), wherein the Commission stated that while it was Commission policy to protect the future expansion of existing growth routes to the extent practicable, it "did not intend to allow the device of prior coordination to be used to give one carrier a veto power over another's technical proposal."

the wasteful use of spectrum by formalizing the reservation of growth channels.¹³

V. DIGITAL SPECTRAL EFFICIENCY STANDARDS SHOULD BE IMPLEMENTED THROUGH A PHASED APPROACH

The Joint Commenters recognize that the spectrum is a scarce and valuable resource that requires efficient use. Indeed, in light of the migration of existing 2 GHz users into higher bands, and the anticipated growth in spectrum demands by existing higher band users, the Joint Commenters view spectrum efficiency as one of the most important factors in determining the technical rules at issue in this proceeding. Accordingly, the Joint Commenters agree that minimum digital modulation requirements should be altered to reflect this need for greater efficiency. Notice at para. 31. Nevertheless, the Joint Commenters believe that in making the transition from 2 GHz to higher frequencies, the needs of users and equipment manufacturers would be best served by a phased approach to implementing new spectral efficiency limits for digital equipment. Under this approach, existing bit-efficiency requirements would apply until the expiration of a five year period.

¹³ In addition to the "reservation" of growth channels, other methods of "warehousing" spectrum should also be limited. Under current Part 21 and Part 94 coordination procedures, users can block the use of frequencies by coordinating a proposal involving those frequencies, purportedly for immediate application. The provisions of Section 21.100(d)(2)(x) allowing coordination showings to be 6 months old, and allowing for subsequent "renewal" of coordination proposals, promote such warehousing. Similar practices have developed under Section 94.15(b) for private users. Accordingly, the Joint Commenters propose that under the new combined private/common carrier coordination procedures, engineering analyses be limited to those 3 months old or less.

An immediate shift to substantially tighter spectral efficiency requirements would impose severe economic hardships on manufacturers, who would have to scrap existing inventories and production lines.¹⁴ Furthermore, an immediate one step shift would force users who need to expand their existing networks to use dissimilar equipment, which would be a substantial financial burden (e.g., the need to purchase extra spares) and would negatively impact personnel training, and in some cases, system reliability. Users would have to scrap their equipment long before the end of its otherwise useful life.¹⁵ Of course, the costs of scrapping useful operating equipment would ultimately have to be passed along to the customers of the users. Lastly, an immediate shift to higher efficiency requirements would substantially favor the one manufacturer that suggested the requirements, and would significantly reduce competition in the provision of microwave equipment, a result that would be harmful to users as well. Alternatively, a five year phase-in period would not only ease the burden of re-tooling on manufacturers, it would promote full and fair competition among manufacturers. Similarly, a five year

¹⁴ A five year phase-in of efficiency standards would be consistent with the Commission's actions in Docket 79-188, wherein the Commission, recognizing the expense to manufacturers of redesigning equipment, established a five-year phase-in period for implementing 1.0 bps/hz efficiency standards for the digital termination service. Digital Termination Systems, Reconsideration Order, 56 RR 2d 1171, 1182-83 (1984).

¹⁵ For example, since the production of existing system equipment would have to be discontinued, manufacturer product support for existing systems would have to be substantially reduced.

transition period would allow users to maximize the use of, and even expand, their existing networks with compatible equipment.

The Joint Commenters propose the following new digital spectrum efficiency requirements to implemented:

<u>Nominal Channel Bandwidth (MHz)</u> ¹⁶	<u>Minimum Payload Capacity (Mbits/s)</u>	<u>Typical Utilization</u>
1.25 MHz	3	2xDS1
2.50 MHz	6	4xDS1
3.75 MHz	12	8xDS1
5.00 MHz	18	12xDS1
10.00 MHz	44	1xDS3 1STS1
20.00 MHz	89	2xDS3 2xSTS1
30.00 MHz	134	3xDS3/3xSTS1/STS3
40.00 MHz	178	4xDS3/4xSTS1

Microwave transmitters employing digital modulation techniques, with appropriate multiplex equipment, operating below 15 GHz and licensed five years after the enactment of these regulations, should be required to comply with these requirements. Existing licenses should be exempt (grandfathered) from complying with the new requirements.

The Joint Commenters believe that this approach will foster increased spectrum efficiency by encouraging users to increase future transport capacity through replacement of signal processing equipment rather than increasing bandwidth or changing frequencies. In addition, the reduced initial loading requirements for equipment using narrower bandwidth channels will allow for the continued use of relatively inexpensive radios employing simpler modulation types

¹⁶ As noted in Section II, supra, the Joint Commenters recommended that the Commission eliminate its proposed 400 and 800 KHz channels, and accordingly, minimum digital modulation standards are not proposed herein for channels with such bandwidths.

where lower payloads are required, resulting in greater utilization of such channels.

**VI. AUTOMATIC TRANSMITTER POWER CONTROL RULES
 SHOULD ALLOW UP TO 10 dB INCREASES IN POWER**

The Joint Commenters are pleased that the Commission has recognized the role that automatic transmitter power control ("ATPC") can play in maximizing efficient utilization of the microwave radio spectrum. However, while the rule revisions proposed in the Notice (para. 33) will clarify that ATPC is permitted under both Parts 21 and 94, as described below, the 3dB power increases allowed under the proposal unnecessarily and substantially limit the benefits that can and should be obtained from ATPC.

By way of background, digital microwave systems can normally operate noise and error free with power levels at the receiver within 6 dB of receiver threshold. This permits successful operation at transmitter power levels that are substantially lower than the power levels needed in analog systems. Consequently, closer re-use of microwave frequencies is possible. At relatively low power levels, however, the margin of safety against fading and interference is narrower. ATPC is a feature that can be incorporated in digital microwave equipment to protect against degradation due to signal fading or interference. The function of ATPC is to vary the power of the transmitter automatically when circumstances require power output changes. Thus, ATPC automatically increases the output power of the transmitter up to its maximum for a short duration if it becomes necessary to